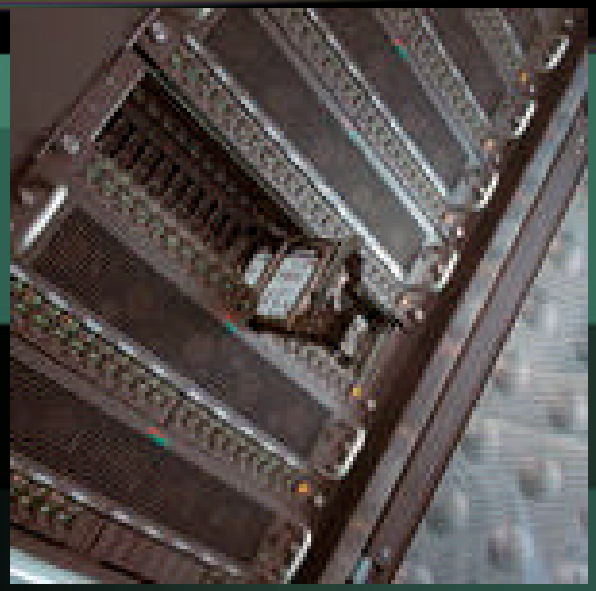


Redefining Blade Performance with Power-Efficient Technology

Ben Williams
Vice President of Commercial &
Server/Workstation Business, AMD

Blade Server Growth & IT Challenges

Growth

2003

2004

Benefits

Blades enable:

- Performance Density
- Physical Consolidation
- Virtual Consolidation

Blades are the fastest growing server form factor. But… Blades have not grown as fast as originally predicted. Why?

Challenges

- Higher Performance
- Power Consumption
- Management

Performance

Enterprises Want:	Increased Productivity | Security | TCO | Compatibility

Solution:	64-bit Technology that gives total backward compatibility with highest 32-bit computing performance.
	Technology is more than 64-bit computing
	Technology that paves the way to multi-core computing with cutting-edge communications technology.
	Technology that allows software developers to create new functionality for end users.
	Technology that solves real problems.

Performance

Multi-Core Capability

- Transcends single-core performance limits
  - Delivers best performance per watt
- Expand compute density effortlessly
  - Delivers best performance per sq I/O
- Maintains a stable IT environment
  - No change to power envelopes
  - No change to infrastructure

Dual Core offers the optimal balance between performance and density for rack dense and blade server designs.

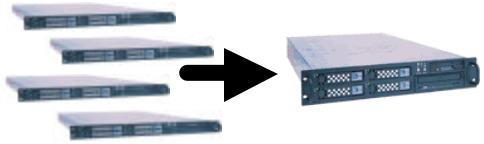
Power Consumption

Lower System Power

- Offers increased density capability
  - Increasing the performance per rack (More blades per rack)
  - Increased performance within power limited datacenter infrastructures
  - Reduce datacenter cost per/square foot
- Provides significant savings towards datacenter energy costs
  - Extends Uninterruptible Power Supply (UPS) up time
  - Keeps air-conditioning costs down

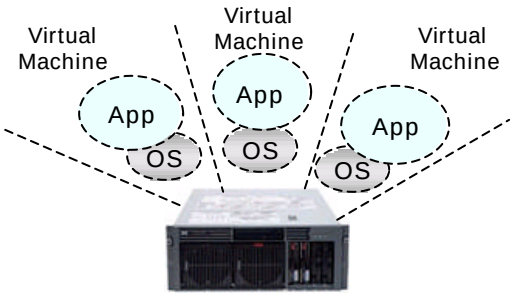
Management

Virtualization

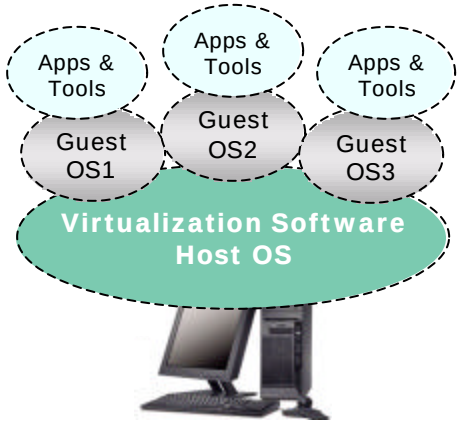


Provides illusion of multiple processors

Server Consolidation & Reduced Hardware Cost



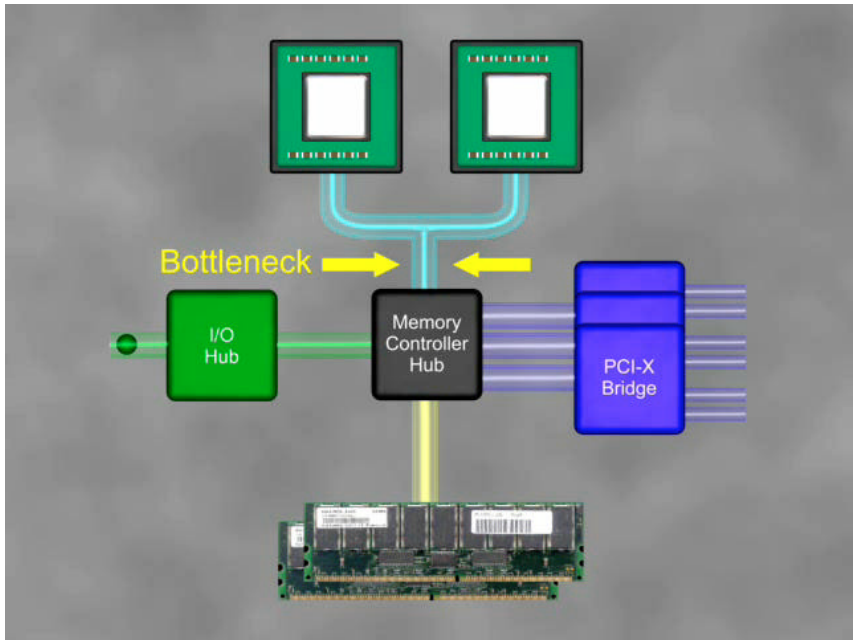
Improved Reliability / Security

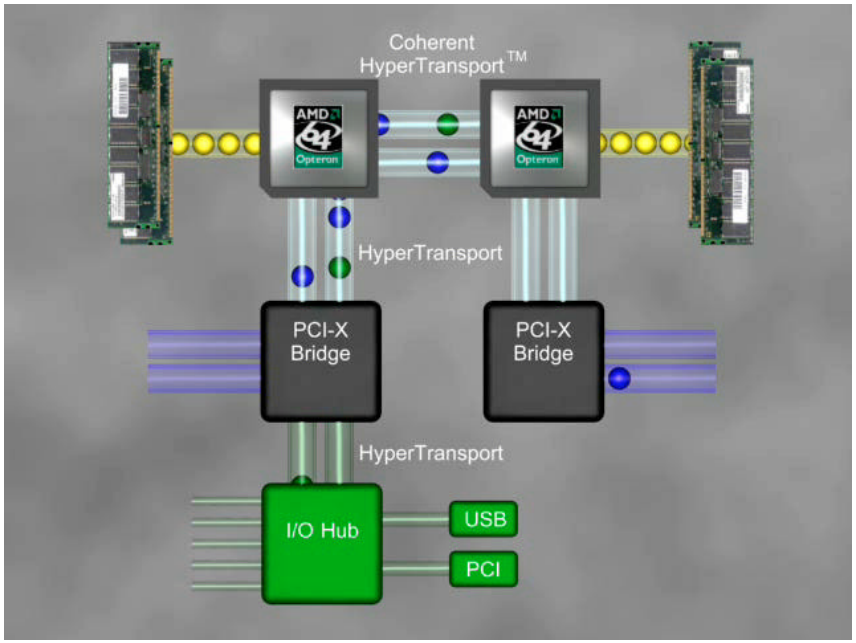


Share workloads at processor level

Development & Deployment

Architecture for the way you compute today





The Spin:

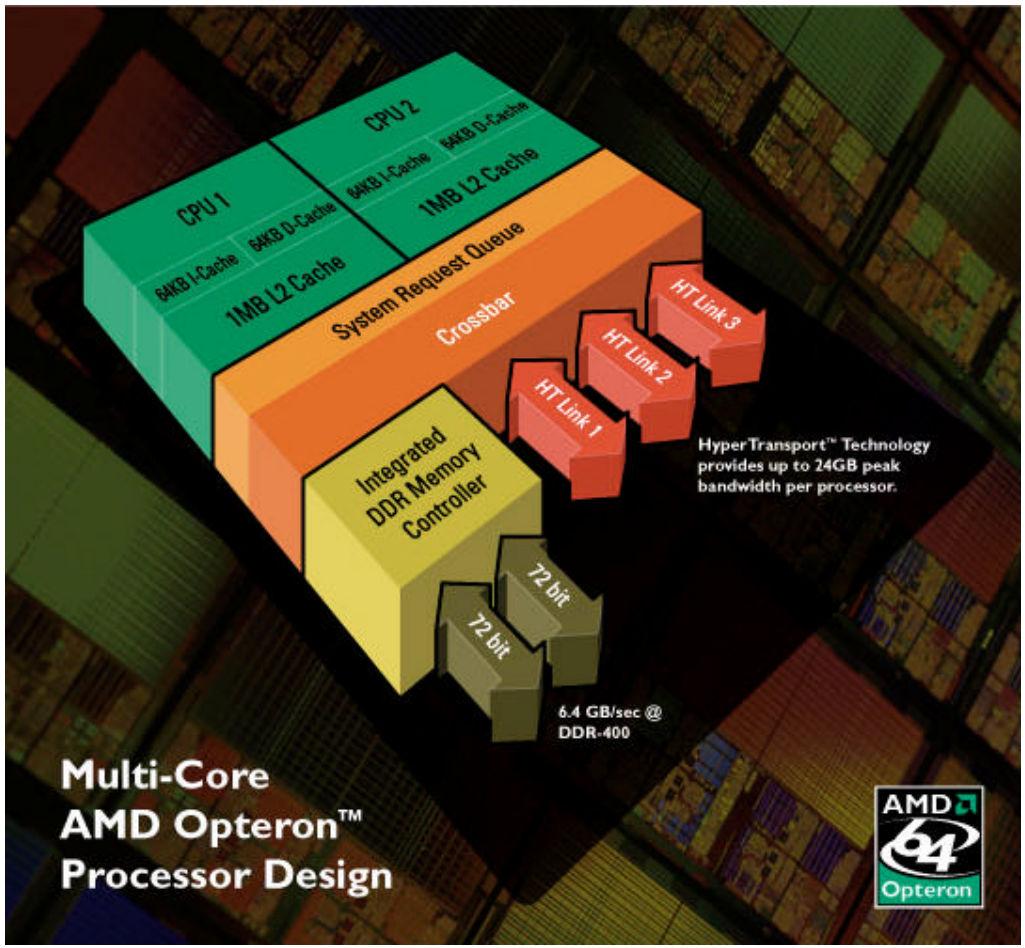
- "Platformization"
- Multiple chipsets for multiprocessors
- Disruptive architectures and roadmaps
- 20-year old front-side bus architecture

The Facts:

- Industry Standard AMD64 technology
- Direct Connect Architecture
- Cross-platform multi-core computing with infrastructure compatibility
- HyperTransport™ technology

AMD Opteron™ Dual-Core Architecture

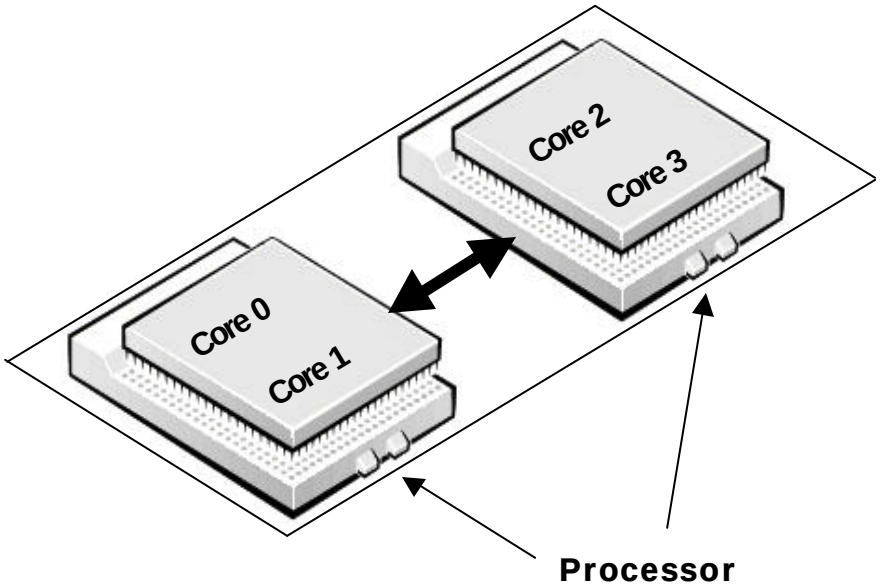
- Designed for Dual Core
- 940-Pin Socket Compatible
- No Changes in Power
- Non-disruptive migration



Software Licensing Strategy

Many ISV's have adopted AMD's early recommendation to license by *processor* instead of by *processor-core*

- Only applies to software licensing models that rely on processor count
- Helps ensure software compatibility with existing x86 and 64-bit operating systems and applications
- While continuing to bring competitive single core products to market



AMD PowerNow!™ Technology

AMD

AMD PowerNow!™ TECHNOLOGY

- AMD PowerNow! technology with Optimized Power Management
  - dynamic, power-on-demand technology
  - helps systems run at optimum performance and power levels, reducing electricity costs while maximizing IT budget dollars.

- Benefits of AMD Opteron processors with AMD PowerNow! technology with Optimized Power Management:
  - Minimizes overall power consumption for enterprise IT and workstation customers by optimizing performance-on-demand.
  - Strengthens the industry-leading performance-per-watt capabilities of the AMD Opteron processor
  - Decreases strain on datacenter cooling and ventilation systems.

AMD Opteron™ Processor Power Savings Advantage

Power-Savings

CPU power-savings of up to 75% while system is in idle state*

62% savings under a workload causing ~ 40% CPU use*

33% savings under a workload causing ~ 62% CPU use*

Increased Capacity/Cost Savings from AMD Opteron™ Processors vs. Intel Xeon Processors

Processors	Increased Capacity
AMD Opteron	25%
AMD Opteron HE	61%*
AMD Opteron EE	103%*

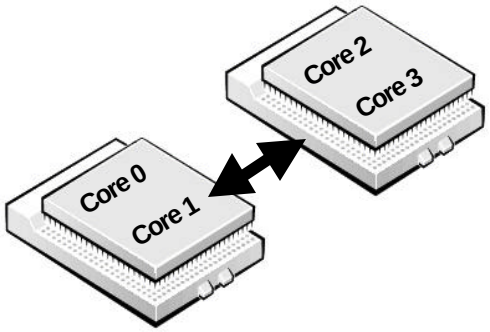
*Estimates using HP DL140 & DL145 power input and BTU generated as baseline. Note: The 2P/1U form factor not applicable in all cases; specific cases shown for demonstration purposes; calculated using HP Power Calculator: http://h30099.www3.hp.com/configurator/calc/Power%20Calculator%20Catalog.xls

Multi-core x86 processing and the 64-bit OS

An Evolutionary step with a Revolutionary impact:

64-bit

Multi-core



Blade Platform with Optimal balance of Power and Performance

AMD Server Blade Partners
Today…. and Tomorrow

AMD

ANGSTROM Microsystems

egenera

hp invent

APPRO HPC Cluster Solutions

Verari systems

Microway Technology you can count on

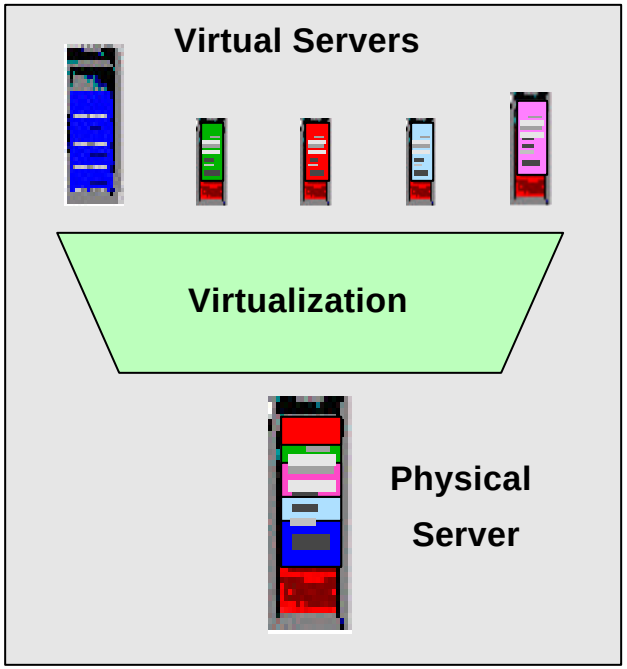
IBM

Western Scientific technology the smart way since 1978.

Sun microsystems

Driving Virtualization into the Processor with "Pacifica"

- Native virtualization of x86 architecture leads to:
  - increased performance with lower overhead
  - enhanced security
  - reduced complexity
- Software-based hypervisor functionality moves into the processor
- "Pacifica" is a logical extension to AMD's Direct Connect Architecture
- Allows software vendors to focus on the value-add



"Pacifica" virtualization technology continues AMD's competitive technology leadership

AMD works with the leading virtualization solution providers today

AMD

Xen Source

egenera

VirtualIron
Virtualization without bounds.™

Microsoft Windows Server System

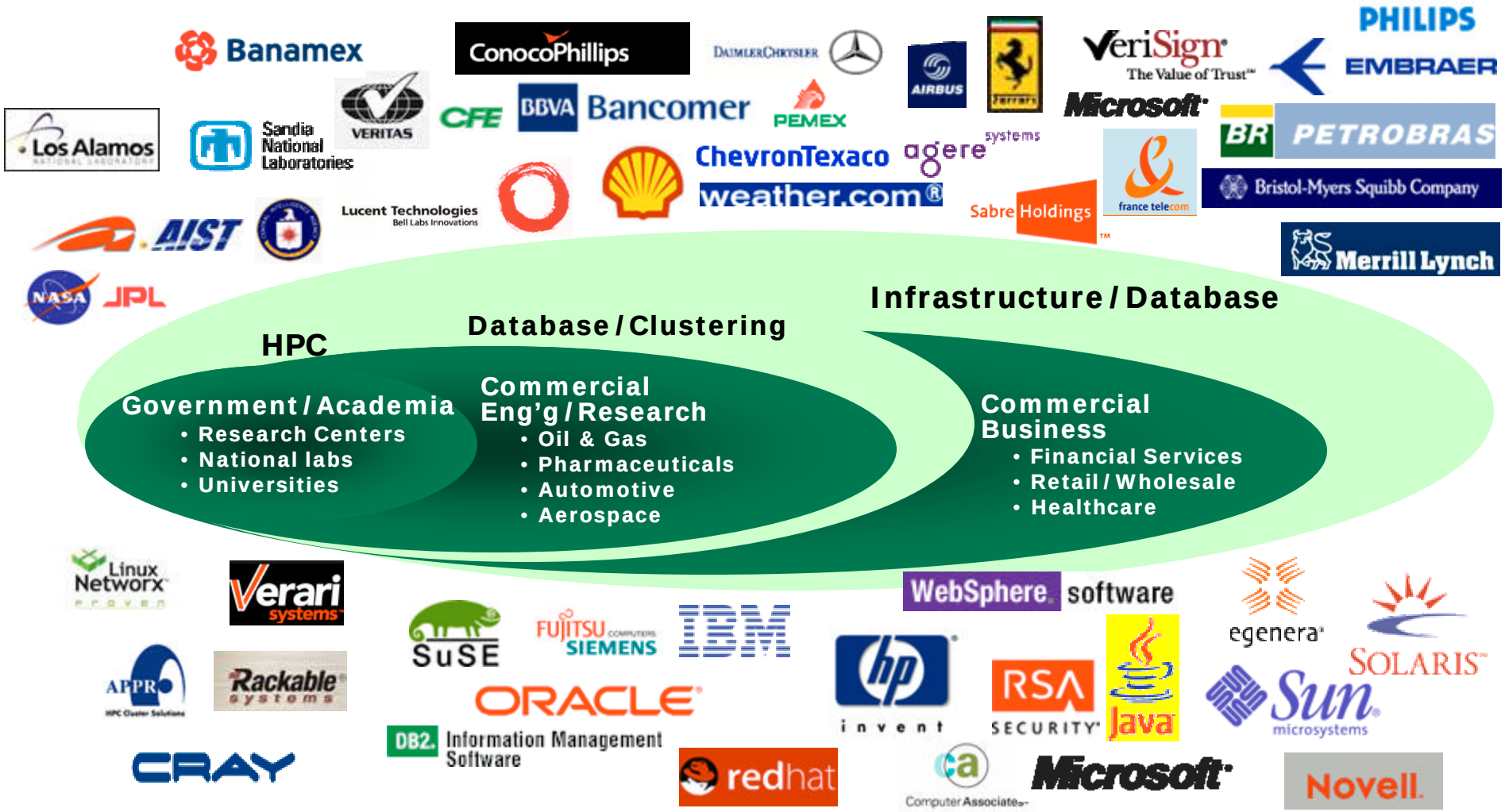
Virtual Server

vmware

Workstation 4

AMD64 Server Momentum

More than **40%** of the Forbes Global 100 companies or their affiliates now use AMD Opteron processor-based systems.



The Perfect Storm

AMD's innovation is enabling *the perfect storm* by meeting the needs of our customers:

- Industry-standard 64-bit computing
  - Evolution and minimal disruption
- Direct Connect Architecture
  - Overcomes the competition's bottleneck
  - Natural evolution to multi-core computing
- AMD PowerNow!™ technology
  - Enables best performance-per-watt in industry
  - Lower blade infrastructure costs
- Creating headroom for the next wave of innovation

Right technology at the Right time

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